Docket:	:	A.07-06-031
Exhibit Number	:	
Commissioner	:	Michael R. Peevey
Admin. Law	:	Jean Vieth
Judge	:	
DRA Witness	:	Charles Mee

DIVISION OF RATEPAYER ADVOCATES
CALIFORNIA PUBLIC UTILITIES COMMISSION

PREPARED TESTIMONY OF CHARLES MEE

A.07-06-031

San Francisco, California
April 5, 2013

1. Introduction and Background

Pursuant to the Scoping Memo and Ruling of the Assigned Commissioner issued on July 2, 2012 in Application (A.) 07-06-031, as amended by the Amended Scoping Memo and Ruling of the Assigned Commissioner issued on November 15, 2012, this testimony presents the Division of Ratepayer Advocates' (DRA) analysis and recommendations on the costs and schedule of undergrounding Segment 8A of the Tehachapi Renewable Transmission Project (TRTP).

In Decision (D.) 09-12-044, the California Public Utilities Commission (CPUC or Commission) granted Southern California Edison Company (SCE) a Certificate of Public Convenience and Necessity to construct Segments 4 through 11 of the TRTP. The TRTP presents the transmission network infrastructure necessary to reliably interconnect generation resources (mainly wind generation) in the Tehachapi Wind Resource Area (TWRA) and, at the same time, provide reliability and economic value for the ISO Controlled Grid. The TWRA lies at the southern end of the San Joaquin Valley in the mountainous region between Bakersfield and Mohave and is California's largest wind resource area.

Segment 8A of the TRTP is a double-circuit 500 kV transmission line connecting the Mesa Substation and and the Mira Loma Substation. The Mesa Substation is located on the west side of the Los Angeles (LA) Basin, and the Mira Loma Substation is on the east side of the LA Basin. Segment 8A goes through the City of Chino Hills (Chino Hills) on a series of 200-foot steel poles passing through a 150-foot wide and approximately 3.5 miles long existing right-of-way (ROW). Chino Hills has raised a number of concerns regarding the portion of Segment 8A that goes through the city. Chino Hills proposed, among other things, that the 3.5 miles of the 500 kV transmission lines be constructed underground. The CPUC stayed the construction of Segment 8A in D.11-11-020, as subsequently modified by D.12-03-050 and reopened the TRTP proceeding to consider the underground options.

2. Summary of DRA recommendations:

1. Do not rush to make a decision on completion of this segment because renewable generators are not being harmed by this minor delay.

2. Re-examine the need to complete Segment 8A in light of the concerns of the local community. There is new information that calls into question the need for Segment 8A as either an aboveground or underground 500 kV option. A smaller line or no line option may be warranted.

3. If after careful consideration of the options, it is still decided that a 500 kV line is necessary for Segment 8A, the previously approved transmission design should be confirmed.

3. Basis of DRA's Recommendation:

3.1. If after careful consideration of the options, it is still decided that a 500 kV line is necessary for Segment 8A, the previously approved transmission design should be confirmed.

SCE, in its February 28, 2013 refined underground testimony described five (5) underground (UG) options, UG1----UG5, as follows:

- **UG1 (Full Configuration):** A double-circuit cross-linked polyethylene (XLPE) transmission line using three cables per phase in conduit placed underground in SCE's ROW in Chino Hills. UG1 is functionally equivalent to Option 6 described in SCE's Response to ACR dated January 10, 2012 (January 10, 2012ACR Response).
- **UG2:** A single-circuit XLPE transmission line using three cables per phase, with ducts and structures installed for the second circuit, in conduit placed underground in SCE's ROW in Chino Hills. Unlike UG1, the costs for UG2 do not include the costs associated with purchasing or installing cable for the second circuit, or for material and labor for installing the reactive compensation necessary to accommodate the second circuit.
- **UG3:** A single-circuit XLPE transmission line using two cables per phase, with ducts and structures installed for a third cable and with ducts and structures installed for the second circuit, in conduit placed underground in SCE's ROW in Chino Hills. Unlike UG1, the costs for UG3 do not include the costs associated with purchasing or installing a third cable for each phase of the first circuit, for purchasing or installing any cable for the second circuit,

or for materials and labor for installing the reactive compensation necessary to accommodate the second circuit.

- **UG4:** A single-circuit XLPE transmission line using three cables per phase in conduit placed underground in SCE's ROW in Chino Hills. UG4 is functionally equivalent to Option 10 described in SCE's Supplemental Response to ACR dated February 1, 2012 (February 1, 2012 Supplemental ACR Response).
- **UG5:** A single-circuit XLPE transmission line using two cables per phase, with ducts and structures installed for a third cable, in conduit placed underground in SCE's ROW in Chino Hills. UG5 is functionally equivalent to Option 11 described in the February 1, 2012 Supplemental ACR Response.

SCE does not support undergrounding Segment 8A of the transmission line in Chino Hills. However, SCE asserts that if the CPUC were to reverse its initial findings that the overhead configuration is the environmentally superior alternative and instead order undergrounding the Chino Hills portion of the Segment 8A, SCE would prefer the UG2 option. SCE believes that the full installation of a double-circuit in the UG2 configuration is needed to meet the load in the Inland Empire. SCE also believes that the second circuit in the UG2 configuration would not be needed at the initial commercialization of the TRTP in 2016, but would be needed by the end of 2021.

In its prepared testimony served March 20, 2013, Chino Hills discussed three options: (1) Alternative A-UG5: This is similar to SCE's UG5 ---- A single-circuit XLPE transmission line using two cables per phase, with ducts and structures installed for a third cable, in conduit placed underground in SCE's ROW in Chino Hills, with three sub-options by using different kind of conductors: (a) 5000 kcmil segmental copper conductor, (b) 5000 kcmil enameled copper conductor, and (c) 4000 kcmil segmental copper conductor.

(2) Alternative A-UG4: This is similar to SCE's UG4 ---- A single-circuit XLPE transmission line using three cables per phase in conduit placed underground in SCE's ROW in Chino Hills, with three sub-options by using different kind of conductors: (a)

5000 kcmil segmental copper conductor, (b) 5000 kcmil enameled copper conductor, and (c) 4000 kcmil segmental copper conductor.

(3) Option 12+1: A single-circuit XLPE transmission line using one cable per phase with a single spare cable in conduit placed underground in SCE's ROW in Chino Hills, using 5000 kcmil enameled copper conductor.

Based on the cost data from both SCE's and Chino Hills's testimony[1], DRA developed the cost information in Table 1 below.

[1] SCE's February 28, 2013 testimony and Mr. Aabo's March 20, 2013 testimony on behalf of Chino Hills.

Cost of Undergrounding Portion of Segment 8A Compared to Cost of Entire Overhead Segment 8A

Proposing Entity	Configuration		Total Cost	Cost Exceeds Overhead
			($M)	($M)
SCE	Overhead		170	0
	UG1	double circuit & 3 cables per phase	893	723
	UG2	single circuit & 3 cables per phase, with duct banks for the second circuit	700	530
	UG3	single circuit & 2 cables per phase, with duct banks for third cable of the first circuit and for the second circuit	653	483
	UG4	single circuit & 3 cable per phase	587	417
	UG5	single circuit & 2 cables per phase, with ducts for the third cable	540	370
Chino* Hills	Alt-UG5-a	UG5-5000 kcmil segmental copper conductor 2 cables per phase, with civil work for 3 cables per phase	322	152
	Alt-UG5-b	UG5-5000 kcmil enameled copper conductor 2 cables per phase, with civil work for 3 cables per phase	324	154
	Alt-UG5-c	UG5-4000 kcmil segmental copper conductor 2 cables per phase, with civil work for 3 cables per phase	316	146
	Alt-UG4-a	UG5-5000 kcmil segmental copper conductor 3 cables per phase, with civil work for 3 cables per phase	347	177
	Alt-UG4-b	UG5-5000 kcmil enameled copper conductor 3 cables per phase, with civil work for 3 cables per phase	350	180
	Alt-UG4-c	UG5-4000 kcmil segmental copper conductor 3 cables per phase, with civil work for 3 cables per phase	339	169
	Option 12+1	5000 kcmil enameled copper conductor 1 cable per phase + 1 cable, with civil work for 3 cables per phase	311	141

* Chino Hills only provided cost estimates to underground 3.5 miles of Segment 8A. For proper cost comparison, DRA added $170 million for the overhead portion of Segment 8A to derive the total cost of Segment 8A.

From Table 1, DRA concludes that all the underground options are more expensive than the overhead configuration. Chino Hills also proposed to contribute $43 or $48 million to the project construction depending on the final decision on the Eastern Transition Station.[2] However, even with this contribution, the underground options are still more expensive than the overhead option.

[2] Ch-9 at 2.

Since the cost of any underground options will be increased significantly from the originally approved overhead option, DRA recommends that the Commission should not approve any of the underground options for portion of Segment 8A.

3.2. Do not rush to make a decision on completion of this segment because renewable generators are not being harmed by this minor delay.

In Chino Hills's testimony (Exhibit CH-8), Dr. Kulkarni [3] provided a report developed by Nexant as part of his testimony. The Nexant report states that "[o]f the configurations and outage patterns studied, Nexant found significant unused capacity of Segment 8A. Based on this analysis, a delay in completion of an underground cable system in Segment 8A or an outage on such a system should not cause significant curtailment of renewable generation in SCE's Northern Area". [4] Similarly in Exhibit CH-6, Chino Hills's witness Dr. Shirmohammadi [5] also noted in his testimony that "even if the implementation of Segment 8A is delayed through the end of 2016, there will be no curtailment of renewable resources anywhere in the entire California Independent System Operator (CAISO) region as a result of such delay." [6] Given the assertions of Drs. Kulkarni and Shirmohammadi and based on current available information on energy supply and demand in SCE's service area, the target in-service date of late 2015/early 2016 as estimated by SCE could be delayed without adversely affecting the renewable resource integration of the Tehachapi CREZs or curtail renewable energy in SCE's Northern Area. Therefore, DRA recommends that the Commission re-evaluate the need for segment 8A in light of new information on need and because of the concerns of the local community.

3.3. The Commission should incorporate newly available information before making a final decision on Segment 8A.

DRA recommends that the CPUC should consider the need for Segment 8A based on currently available information. In 2006, CAISO conducted the study for the TRTP and developed a study report ---- the CAISO South Regional Transmission Plan for 2006 (CSRTP-2006) Report. According to the CSRTP-2006 report, the purpose of the TRTP is to interconnect 4,350 MW of generation resources (mainly wind generation) in the Tehachapi Wind Resource

[3] Dr. Kulkarni sponsord Exhibit CH-8 on behalf of Chino Hills
[4] CH-8 Dr. Kulkarni testimony, Nexant report at 2.
[5] Dr. Shirmohammadi sponsored Exhibit CH-6 on behalf of Chino Hills
[6] CH 3/20/2013 Dr. Shirmohammadi testimony at page 23.

Area (TWRA) to the CAISO grid.[7] D. 09-12-044, which approved the TRTP, was based on this study report conducted seven years ago when potential renewable resources within the LA Basin were not yet identified or not commercially available. With the identification and development of more renewable resources and technologies in California during the past seven years, the CPUC, the California Energy Commission (CEC), and the CAISO have gained more knowledge and experience in integrating renewable resources into California's transmission grid. For example, while wind generation's peak output occurs in the evenings, solar generation's peak output almost matches the peak demand. Since wind and solar resources are complementary resources which peak at different times of the day, there is no need to double transmission capacity in order to deliver both wind and solar resources at the same time. Also, demand side resources have also influenced the manner in which energy demand is met in California. Consequently, transmission planning now considers the interactions among conventional generation, renewable generation including wind and solar generation, demand, and demand side resources. Given that there have been several significant developments potentially affecting service to the L.A. Basin, that a delay in construction of Segment 8A will not in the short term cause reliability issues or impact renewable development, and Chino Hills' concerns, the CPUC should take the opportunity to consider important issues regarding the need for Segment 8A. DRA recommends that the CPUC consider the following factors:

3.3.1. Segment 8A should not be constructed to provide an unnecessary guarantee for the Energy Only generation.[8]

To accommodate generator interconnections, CAISO developed a methodology to assess transmission need to accommodate two categories of generator interconnection requests---- Full Capacity and Energy Only. SCE disagrees with the CAISO's approach. However, DRA believes the CAISO's approach is appropriate because of different contractual obligations between CAISO and these generators.

For the Energy Only generators, both generator owners and the CAISO understand that the generation is subject to curtailment at any time depending on the availability of transmission capabilities on the grid. When the generator owners choose the Energy Only option, they are not

[7] CAISO South Regional Transmission Plan for 2006 (CSRTP-2006) at 4.
[8] SCE's February 28 2013 Testimony, pp. 12 – 16.

obligated to pay for any network upgrade associated with delivery of power generation. Ratepayer funds should not be used to recover costs associated with guaranteeing delivery of electricity generated by Energy Only generators. Consequently, DRA believes transmission owners should not spend ratepayer funds to build transmission to provide any power delivery guarantee to those Energy Only generators.

Even for generators who choose the Full Capacity option, SCE asserts that the CAISO only assumed 80% of the Net Qualifying Capacity and "CAISO's Deliverability Assessment dispatch assumptions do not reflect the actual amount of generation potentially available because they inherently assume a significant amount of curtailment in place before the Deliverability Assessment is even performed."[9] The simultaneous aggregated generation capacity that is needed for transmission is always less than the sum of each individual generator that happens at different times. Also, actual power generated is most likely less than planned power generation reflected in interconnection agreements or power procurement agreements. DRA believes that transmission infrastructure should be planned, designed and constructed to deliver simultaneous aggregated generation capacity instead of the sum of individual generation capacity. In determining power transfer capability and need of Segment 8A, the Commission should use the CAISO's approach to determine if Segment 8A is necesary.

3.3.2. Generation updates from the Tehachapi area should be considered when deciding on Segment 8A.

In 2006, when the CAISO was conducting the studies for the TRTP, it had assumed that, "the primary goal of the Tehachapi Transmission Project is to provide transmission infrastructure to allow the wind generation potential in Tehachapi, estimated at a minimum of 4,500 MW, to reach California consumers."[10] However, in the 2013/14 transmission planning process, the Commission's Energy Division developed the renewable energy portfolio [11] and concluded that only 2,176 MW of renewable generation will come from the Tehachapi CREZ. Given the CPUC staff's revised energy resource estimate of 2,176 MW from the Tehachapi CREZ, it appears that SCE has overstated the power transfer capability requirement of TRTP by assuming that a total of 9,516 MW of generation from both Lugo Area and the Northern Area will need to be

[9] SCE Refined Underground Testimony filed in this case on February 28, 2013 at Page 13-14.
[10] CAISO South Regional Transmission Plan for 2006(CSRTP-2006)
[11] http://www.cpuc.ca.gov/PUC/energy/Procurement/LTPP/2012+LTPP+Tools+and+Spreadsheets.htm

delivered to the east side of the LA Basin.[12] With a potentially significant decrease (approximately 77%) of the renewable resources that need to be delivered to the LA Basin, DRA recommends that the Commission should re-consider the need or the power transfer capability of the Segment 8A.

3.3.3. More CREZs are identified and developed in the Inland Empire area.

As the Commission has stated, the "TRTP is designed to provide access to up to 4,500 megawatts (MW) of renewable energy generation, primarily wind energy, from the Tehachapi Wind Resource Area in Kern County and to deliver it to load in Los Angeles and San Bernardino counties."[13] In a meeting between DRA[14] and SCE[15] on March 21, 2013, SCE confirmed that the primary purpose of Segment 8A is to deliver renewable generation from the Tehachapi area to serve load in the Inland Empire area in the east side of the LA Basin.

However, based on currently available CREZ information, the CPUC has now included additional renewable resources from the Inland Empire area, including Imperial, San Bernardino, Palm Springs, and the Eastern Area and other CREZs in its Long Term Procurement Plan. For example, in the renewable energy portfolio, the CPUC assumed that 1,700 MW of renewable generation will come from Imperial[16]. Subsequently, in its 2013/14 transmission planning process, the CAISO incorporated the newly identified CREZs into its update of renewable generation assumptions. Similarly, DRA recommends that the CPUC should also revise downward the updated renewable generation assumptions to evaluate the need for Segment 8A. The renewable development in the east side of the LA Basin could change the power flow situation of the grid and resource supply to the LA Basin. As a result, Segment 8A that several years ago was determined to be needed to bring renewable resources from the Tehachapi area may no longer be needed based on the available renewable resources from the east side of the LA Basin. Given this updated information, the CPUC should plan for new renewable generation from the east side of the LA Basin, instead of the renewable resources from the Tehachapi

[12] SCE February 28, 2013 testimony at p 19.
[13] D.09-12-044, p. 2.
[14] Linda Serizawa, Deputy Director; Chloe Lukins, P.E., Program Manager, EPP Branch; Joseph Abhulimen, P.E., Program and Project Supervisor, EPP Branch; Noel Obiora, Legal Counsel; and Charles Mee, P.E., EPP Branch.
[15] Charles Adamson, Manager, Major Projects Organization; Susan J. Nelson, Manager Strategic Planning; Jorge Chacon, Manager, Generation Interconnection Planning.
[16] See footnote 12.

CREZs, to serve the load in east side of the LA Basin. From design and economic perspectives, it is more practical and cost effective for SCE to serve load in the east side of the LA Basin by resources near this service area rather than from Tehachapi via Segment 8A. Moving the needed power to the LA Basin through a shorter transmission path will increase transmission efficiency and decrease transmission losses.

3.3.4. SCE is spending almost $1 Billion in constructing transmission facilities on the east side of the LA Basin that will serve part of the load that was anticipated to be served by Segment 8A

In D. 07-01-040, the CPUC authorized SCE to construct the Devers-Colorado River Transmission Line Project, which could potentially cost one billion dollars. The main components of this project include, among other things:

- A new 110-mile 500 kV transmission line between SCE's Devers Substation near Palm Springs and the new Colorado River Switchyard, paralleling the existing Devers-Palo Verde No. 1 (DPV1) transmission line.
- A new 42-mile 500 kV transmission line between Devers Substation and SCE's Valley Substation in Menifee. The line would be parallel to the existing Devers-Valley transmission line.
- A new 500 kV Colorado River Switchyard near Blythe.
- A 500 kV series capacitor adjacent to the existing DPV1 series capacitor, and
- Substation upgrades at the Devers and Valley Substations.

SCE currently is constructing this project and expects to complete it by the end of 2013. This project will increase the power transfer capability between the Colorado River, Devers, and Valley substations by approximately 1,200 MW.[17] When this project becomes operational, DRA surmises that the load in the Inland Empire can be served by this transmission line instead of Segment 8A. Consequently, the need for delivering power from the Tehachapi CREZs via the Vincent Substation and the Mira Loma Substation could be decreased or eliminated. Therefore, DRA recommends that the CPUC recognize that the transmission upgrades for the Colorado River Substation, Devers Substation, Valley Substation, the Inland Empire Substation, and the

[17] SCE Advice Letter 2804-E filed at the CPUC Energy Division on November 2, 2012.

transmission lines connecting these substations, will serve the transmission needs that were originally anticipated when Segment 8A was proposed over 5 years ago.

3.3.5. SCE is planning to upgrade the Mesa Substation to 500 kV.

One of the components in Segment 11 of TRTP is "[a] rebuild of approximately 18.7 miles of existing 220-kV transmission line to 500-kV standards between the existing Vincent and Gould Substations." [18] This 500 kV transmission line cannot be operated at 500 kV voltage level at present because the Mesa Substation is a 230 kV substation. When the CPUC approved Segment 11, it was understood that SCE would extend the Segment 11 to the Mesa Substation when the Mesa Substation is upgraded to 500 kV in the future.

During the meeting between DRA and SCE on March 21, 2013, SCE stated that it has already started planning to upgrade Mesa Substation to 500 kV, but it has not yet made the proposal in a formal application. DRA also discussed the upgrade of the Mesa Substation to 500kV with a CAISO transmission planning subject matter expert. [19] On April 5, 2013, DRA also sent a letter to CAISO requesting that the CAISO assess the impact of the Mesa Substation upgrade to the grid. If the CAISO concludes that the impact to the grid is favorable, then DRA believes that the upgrade of the Mesa Substation to 500 kV could be used to serve the load in west side of the LA Basin, while the renewable generation in the Inland Empire will be used to serve the load in Mira Loma area. This will eliminate the need for Segment 8A.

On the east side of the LA Basin, there are two 500 kV substations - Mira Loma Substation and Rancho Vista Substation - but on the west side of the LA Basin there is no 500 kV substation. If the Mesa Substation can be upgraded from 220 kV to 500 kV, the 500 kV power supply network will be more balanced. While load on the east side of the LA Basin can be served by the Mira Loma Substation and the Rancho Vista Substation, load on the west side can be served by the upgraded Mesa Substation. With this option, the 500 kV transmission line through Chino Hills (between the Mesa Substation and the Mira Loma Substation) may not be needed. Based on DRA's preliminary analysis, if the Mesa Substation is upgraded appropriately, elimination of the 500 kV transmission line between the Mesa Substation and the Mira Loma

[18] D. 09-12-044 at page 29.

[19] On March 20, 2013, DRA spoke to Songzhe Zhu of CAISO.

Substation will not impact the integration of renewables, reliability compliance requirements, and congestion relief that TRTP provides.

If the Mesa Substation is upgraded to 500 kV, the transmission facilities located in the west side of the LA Basin, including the Vincent Substation and the Mesa Substation, will be able to handle more renewable energy delivery from the Tehachapi area to load located in the west side of the LA Basin. As a result, Segment 8A will not be needed to deliver residual power to the east side of the LA Basin, or the power transfer capability requirement for Segment 8A may be eliminated. Therefore, the CPUC should consider upgrading the Mesa Substation to 500 kV before deciding on the need for Segment 8A. DRA does not have cost estimates to upgrade the Mesa Substation at this time. DRA recommends that the Commission should evaluate the cost for this upgrade.

3.3.6. More Demand Side Resources are developed, therefore helping to reduce or eliminate the need for Segment 8A.

California energy policy encourages increased development and use of demand side resources such as Distributed Generation, Demand Response, Energy Efficiency, and Zero Net Energy homes. For example, in a preliminary assessment conducted by the CPUC titled "Technical Potential for Local Distributed Photo-voltaic in California," and issued in March 2012, it was estimated that California has the potential to produce more than 15,000 MW from Local Distributed Photo-voltaic projects between now and 2020. Also the CEC estimates that there will be more than 1,930 MW of distributed generation in Los Angeles County. [20] SCE also reported that in February 2012, more than 1,400 MW of demand response occurred in its service territory.[21]

The primary purpose of transmission infrastructure is to deliver bulk power from remote generation to load centers. When demand is reduced by demand side or served by local distributed generation, the need for additional transmission infrastructure may be reduced or eliminated. Therefore, the CPUC should incorporate demand side resources estimates when assessing the need for Segment 8A.

3.3.7. Siting of Segment 8A is questionable.

[20] http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf
[21] SCE Monthly ILP and DR Report February 2013.

The main function of a high voltage 500 kV transmission line is to deliver power from remote generation to the farthest boundaries of communities. In the case of the TRTP, a 500 kV transmission line should be designed to deliver power generated from the Tehachapi CREZ to the edge of LA Basin. When the 500 kV transmission line reaches the edge of the LA Basin, it should end at a substation which serves to reduce the voltage from 500 kV to 230 kV. There are at least two main reasons for this design approach:

(1) A lower voltage transmission line such as a 230 kV line crossing through communities is more acceptable to residents and the impact of the line on the community can be tolerated because lower voltage transmission lines have (a) lower electromagnetic field (EMF), (b) reduced right-of way requirements, and (c) shorter transmission towers. Conversely, the community impacts of a 500 kV transmission line are harder to mitigate because higher voltage transmission lines have (a) higher EMF, (b) wider right-of way requirements, (c) taller transmission towers, and (d) corona noise. Therefore, the construction of a 500 kV transmission through a community is like to result in greater environmental impact to a community.

(2) A lower voltage transmission line can be easily accessed by i industrial or commercial customers, while it is impractical for any customer to directly assess power on the 500 kV extra high voltage transmission line.

APPENDIX A

Qualifications and Prepared Testimony of Charles Mee, P.E.

Q1. Please state your name and business address.

A1. My name is Charles Mee and my business address is 505 Van Ness Avenue, San Francisco, California 94102

Q2. By whom are you employed and in what capacity?

A2. I am employed by the Division of Ratepayer Advocates (DRA) of the California Public Utilities Commission as a Senior Utilities Engineer -- Specialist.

Q3. Please describe your educational and professional experience.

A3. In 1984, I graduated from Tsinghua University in Beijing, China with a Bachelor of Science degree in Electric Power Engineering.

From 1984 to 1998, I worked for Henan Electric Power Test and Research Institute in Henan Province, China in the capacity of Assistant Electric Power Engineer and performed the following tasks:

- Conducted technical research on electrical power equipment such as: transformers circuit breakers, transmission lines, and insulators for their electrical and characteristics and insulation levels.
- Measured operational over-voltages of the Henan Province electric power grid and developed recommendations on how to mitigate the over-voltages.

From 1988 to 1992, I worked for Hainan Province Electric Power Company in Hainan Province, China in the capacity of Electric Power Engineer and performed the following tasks:

- Monitored insulation level of high voltage generators, transformers, and circuit breakers. Monitored operational over-voltages of the high voltage equipment and the power grid.
- Supervised testing of power devices including generators, transmission lines, transformers, and circuit breakers.
- Drafted testing plans and testing reports.
- Coordinated with colleagues on the operation and maintenance of the power transmission and power generation facilities.

- Coordinated with colleagues on the planning, budgeting, engineering, constructing, and commissioning of new generators, power transmission lines, and power substations.

From 2002 to 2010, I worked for California Department of Water Resources in Sacramento, California in the capacity of Associate Hydroelectric Power Utility Engineer and Senior Hydroelectric Power Utility Engineer (Supervisor), and performed the following duties:

- Participated in the CAISO stakeholder processes including planning, designing, and implementing Market Redesign and Technology Upgrade (MRTU). Collaborated on issues such as day ahead and real time energy markets, ancillary services markets, unit commitment, congestion management, locational marginal prices, market power mitigation, grid reliability, resource adequacy, and demand response.
- Participated in the CAISO stakeholder processes to solve issues in transmission planning, generator interconnection, local capacity studies, transmission rates, and grid management charges.
- Intervened into transmission owners' tariff filings, transmission contracts rates, and reliability services rates.
- Conducted studies including special protection scheme, power and transmission contracts cost benefit analysis; transmission cost forecasting; transmission and interconnection planning; State Water Project (SWP) facility capabilities in providing ancillary services to the CAISO market; SWP resource modeling; market transactions reporting and reconciliation; and cost impact of stakeholder proposals to SWP power operations.

From November 2010 to February 2013, I worked for the Energy Division of the California Public Utilities Commission, in San Francisco, California, as a Senior Utilities Engineer Specialist, and performed the following tasks:

- Facilitated settlement on demand side resources interconnection to utilities' distribution systems.
- Commented on the CAISO power market refinement including renewable resources integration and market power mitigation.
- Drafted resolution on IOU transmission project advice letters and tariff amendments to assess charges for station power services.

Q4. What is the purpose of this testimony?

A4. I am the sponsor of DRA's Prepared Testimony in the Tehachapi Renewable Transmission Project proceeding, A. 07-06-031.

Q5. Does this complete your testimony?

A5. Yes, it does.

CERTIFICATE OF SERVICE

I hereby certify that I have on this date served a copy of **PREPARED TESTIMONY OF CHARLES MEE** to all known parties by either United States mail or electronic mail, to each party named on the official service list attached in **A.07-06-031**:

I also hand-delivered a hard copy to the assigned Administrative Law Judge's mail slot.

Executed on **April 5, 2013** at San Francisco, California.

/s/ ROSCELLA V. GONZALEZ

Roscella V. Gonzalez

CALIFORNIA PUBLIC UTILITIES COMMISSION
Service Lists

PROCEEDING: A0706031 - EDISON - CPCN CONCER
FILER: SOUTHERN CALIFORNIA EDISON COMPANY
LIST NAME: LIST
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